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VEGETATION AND FLORA OF
THE ARAVAIPA CREEK PRIMITIVE AREA,
GRAHAM AND PINAL COUNTIES, ARIZONA_x

by

(William G. Kepner)

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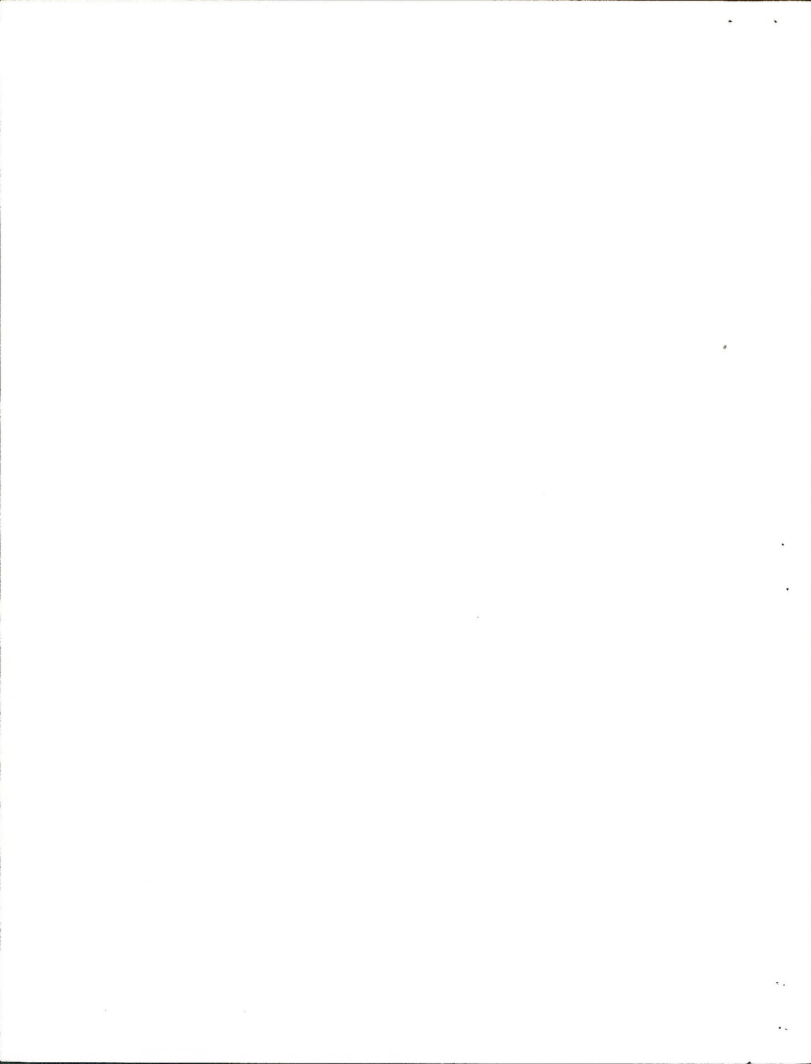
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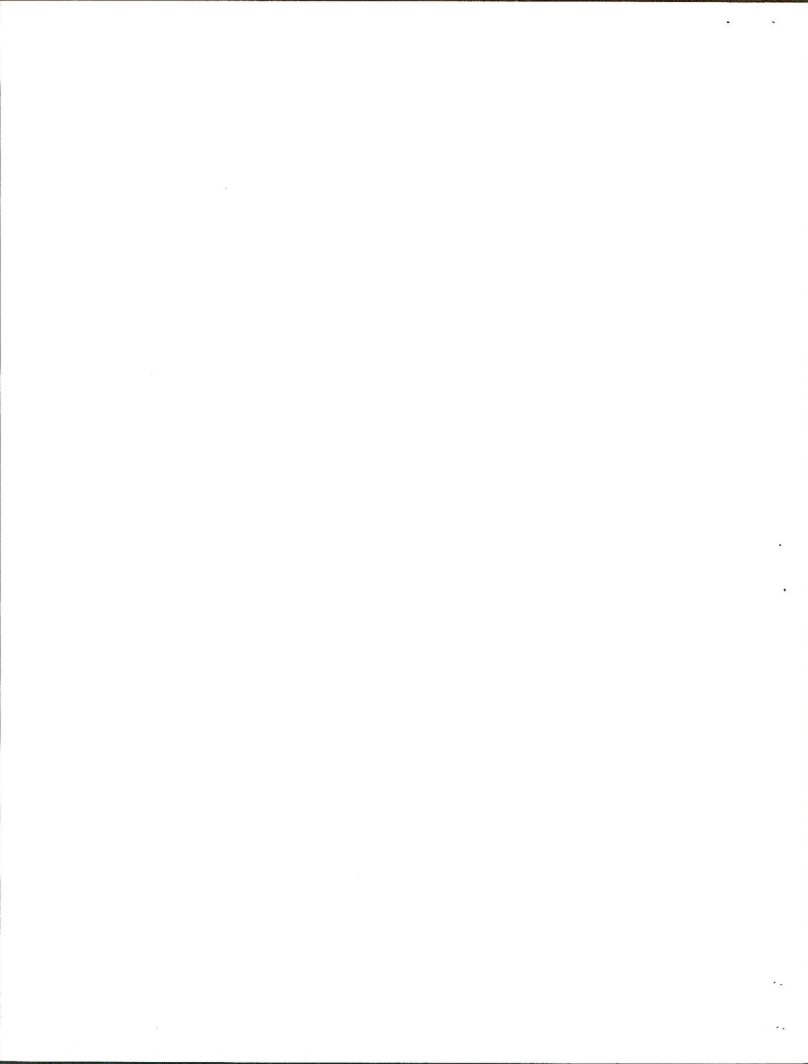
INTRODUCTION

Aravaipa Creek in Graham and Pinal counties, Arizona, is a unique desert riparian community which intergrades the Upper and Lower Sonoran Life-zones (Life-zones based on C. H. Merriam, et al., 1910). It is administered by the Bureau of Land Management as a Primitive Area. Adjacent properties which provide access to the Aravaipa Canyon Natural Area are owned by the Defenders of Wildlife and set aside as the George Whittell Wildlife Reserve. Together, these two areas comprise approximately 3,237.5 hectares (8,000 acres) along more than 17.7 km. (11 miles) of Aravaipa Creek.²⁰

The creek drains the northern Galiuro Mountains and percolates through the sand/gravel aquifer of Aravaipa Valley until it arises at a point approximately 6 km. northwest of Klondyke at an elevation of 1,007 m. (3,303 ft.).² It remains perennial for a distance of 35 to 45 km. before returning underground. On occasion, during periods of high discharge, the creek will reach its confluence with the San Pedro River, elevation 658 m. (2,160 ft.). But the periods are restricted to winter storms of long duration, heavy spring runoff, and/or heavy summer thunderstorms.

At about 8 km. downstream from Klondyke, Aravaipa Creek enters a canyon cut in the mid-Tertiary Galiuro Volcanics, a series of alternating tuffs, rhyolites, and andesites.^{18,24,25} The canyon interior is characterized by having numerous side canyons, large boulders, and steep canyon walls which can exceed vertical heights of 250 m. from the streambed. Near Woods Ranch, elevation 792 m. (2,600 ft.), the canyon begins to widen into a streamcourse of decreased gradient under a broken to open riparian canopy. It later passes over the bajada onto alluvial sediments and most generally returns subsurface before reaching the San Pedro River.

Air temperatures for the Aravaipa area range anywhere from -5°C , during the winter coolness of January, to daytime highs of more than 38°C in the summer months of June and July.² Total annual precipitation is variable, but typically is highest in July and August and lowest in April through May. Mean annual precipitation for the upper Aravaipa Creek area near Klondyke is 34.7 cm.¹⁹ whereas the lower Aravaipa Creek area receives an average 38.1 cm. (Dudleyville weather station, 21 km. west of Woods Ranch).



VEGETATION

Aravaipa Creek occurs within the Sonoran Desert which covers most of southwestern Arizona and, as indicated earlier, is characterized by a hot, arid climate with a bi-seasonal rainfall regime, winter and summer precipitation with spring and fall drought.

The source of Aravaipa Creek is located within the Upper Sonoran Life-zone, a zone which ranges from 1,067 or 1,219 m. (3,500 or 4,000 ft.) in elevation to as high as 2,134 m. (7,000 ft.) and includes grassland, chaparral, and open woodland communities.¹⁵

Within this zone, upper Aravaipa Creek is best characterized as a desert-grassland, a highly diverse type of community where grasses are comingled with various shrubs e.g., yuccas (*Yucca* spp.), sotol (*Dasylirion wheeleri*), jojoba (*Simmondsia chinensis*) and beargrass (*Nolina microcarpa*), and where junipers (*Juniperus monosperma*) are scattered on the north-facing slopes. This type of community most generally occurs on shallow-soiled, gravelly to rocky hills and slopes. It often represents a grass-dominated transition between either the open woodland or chaparral above and the desert-scrub below. As a transitional area, desert-grassland receives between 25.4 and 38.1 cm. (10 and 15 inches) of precipitation annually and occupies Arizona landscapes from below 1,067 m. and prevails upward to approximately 1,524 m. (5,000 ft.) in elevation.¹⁶

Downstream, desert-grassland grades into the desert-scrub of the Lower Sonoran Life-zone. In Arizona, total annual precipitation and elevation within this zone range from 7.6 cm. to 25.4 cm. precipitation and from 30.5 m. to approximately 1,219 m. elevation, according to slope exposure.



The Lower Sonoran desert vegetation represents approximately 9% of the Arizona flora (≈ 303 spp.) and is most widely characterized by two principal life-forms: (1) open, well-spaced microphyllous shrub vegetation that is either predominant or exclusive; and (2) spinose, succulent and/or microphyllous short tree vegetation, collectively called desert-scrub.¹²

The first is most clearly represented by creosote bush (Larrea divaricata) communities in which trees are usually lacking and shrubs and dwarf shrubs are dominant and widely scattered. This is a climax community which is characterized by soils of fine texture that are often alkaline and which inhabits areas of low relief i.e., the desert floor.

The second is most often represented by, but not restricted to, paloverde-saguaro (Cercidium-Cereus) communities. In this community, plants are comprised of small-leaved trees, as well as shrubs and numerous cacti. Best development is attained on rocky hills and coarse-soiled slopes i.e., the bajada, where the substratum is on or near the parent bedrock material. Plant morphology is highly diverse with leafless, drought deciduous, and evergreen species. Community biomass and productivity are greater here than in the creosote bush communities on the valley fill of the plains below. Shrubs are more varied than the trees, and although the foothill understory may be predominantly of a single species e.g., triangle-leaf bursage (Ambrosia deltoidea) or brittlebush (Encelia farinosa), it is often comprised of a mixture of 5 to 15 or more shrub and dwarf shrub species in the form of a layered understory.

Riparian habitats are distinct biotic communities associated with perennial or intermittent watercourses. They are unique reservoirs of

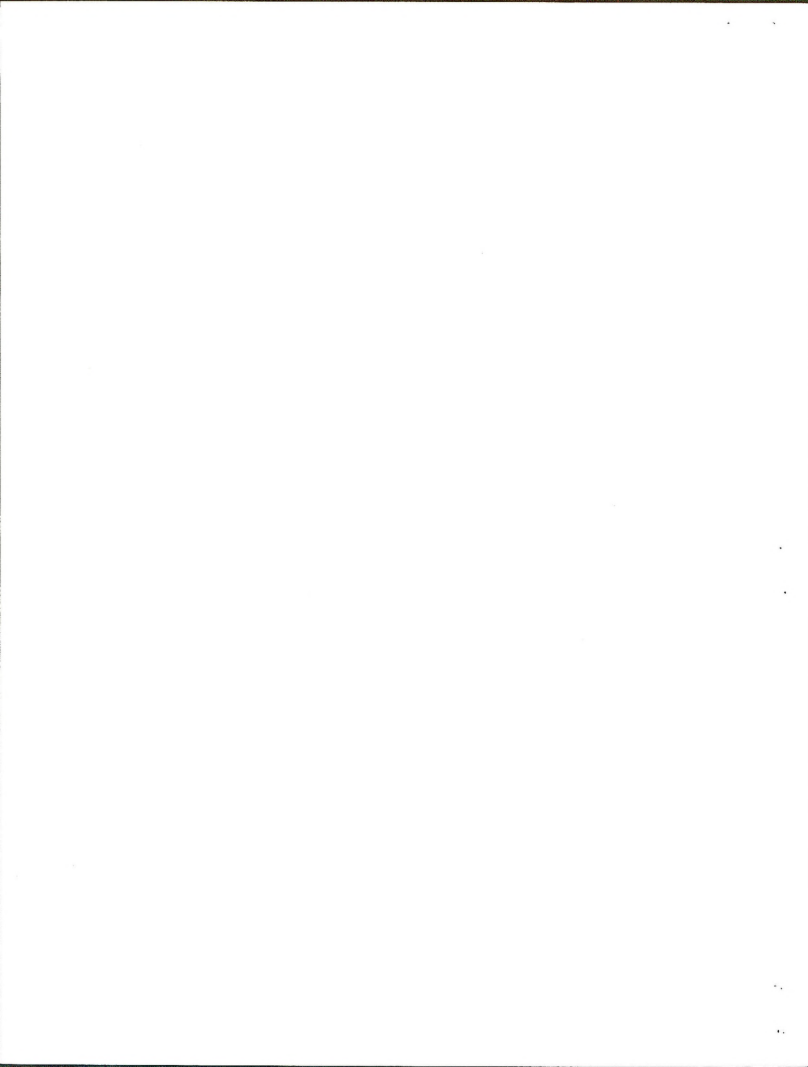


plant and animal diversity which extend from the desert-scrub of the Lower Sonoran to the fir forests of the Canadian Life-zone. These habitats consist of different life-forms or species other than those of the immediately surrounding non-riparian climax.¹⁰ Riparian communities in Arizona have been reduced or eliminated by past and present land management to the point where it is estimated that total riparian area comprises only 113,152.6 hectares (279,600 acres) within the state, of which 40,752.7 hectares (100,700 acres) are adjacent to the Gila River.¹

Following the classification outlined in Brown and Lowe (1974a), Aravaipa Creek best represents the Temperate Riparian Deciduous Biome, a warm-temperate, winter deciduous woodland. Because riparian communities generally exhibit a predictable vertical zonation where composition and form of the riparian woodland changes with elevation, this biome can be subdivided into two major communities: Mixed Broadleaf and Cottonwood-Willow.

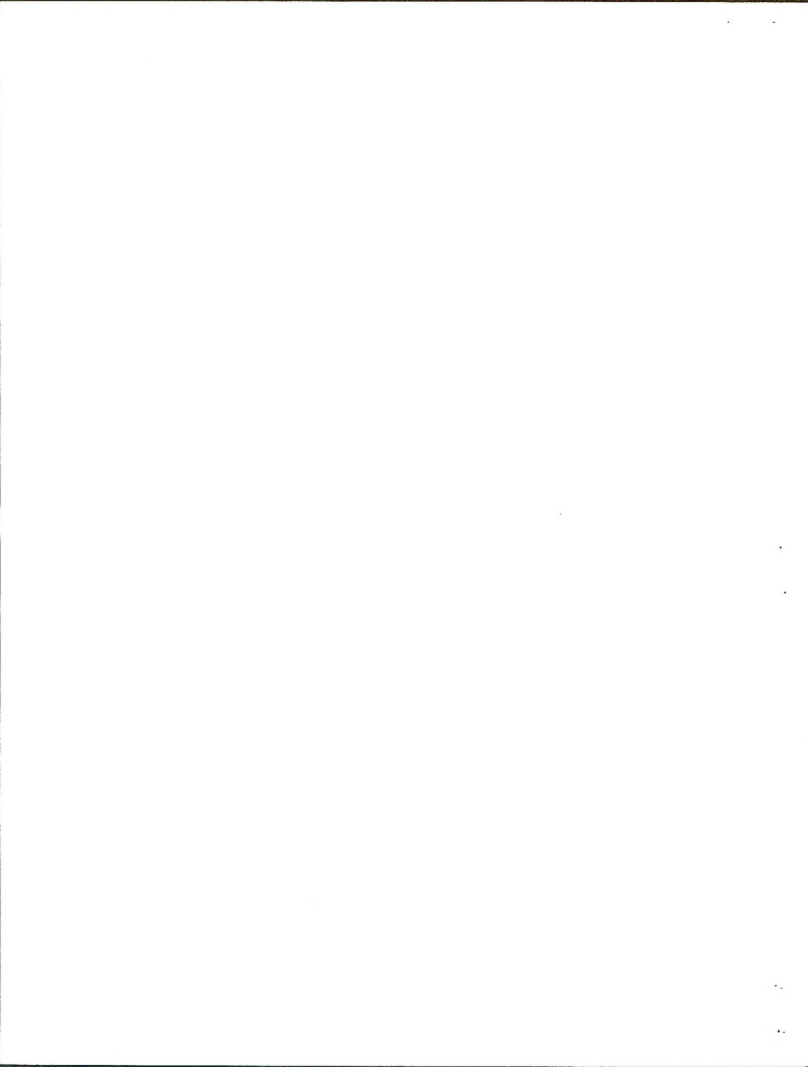
Mixed broadleaf communities are usually found along rubble-bottomed perennial and semiperennial streams and are characterized in Aravaipa by a cottonwood (Populus fremonti), willow (Salix spp.), sycamore (Platanus wrightii), velvet ash (Fraxinus pennsylvanica subsp. velutina), walnut (Juqlans maior), and box elder (Acer negundo) canopy with a thick, luxuriant understory. A continuum condition exists in the Aravaipa area, where broadleaf species occur throughout the drainage but are most prevalent at the upper reaches.

Although no discreet boundaries exist downstream between species aggregations, vegetation within Aravaipa Canyon grades into a community dominated by cottonwood and willows (Salix gooddingii, S. bonplandiana).



The understory may be a dense stand of riparian tree regeneration or shrubs to relatively open and parklike areas. Willows, principally Salix gooddingii, outnumber cottonwood, and seep willow (Baccharis salicifolia) is the principal shrub of the understory. Cat-tail (Typha sp.) and watercress (Rorippa nasturtium-aquaticum) may be found growing in the creek itself along with algae which demonstrate seasonal trends of abundance, mostly encrusting diatoms (Bacillariophyceae) or filamentous Cladophoraceae (Cladophora sp.).

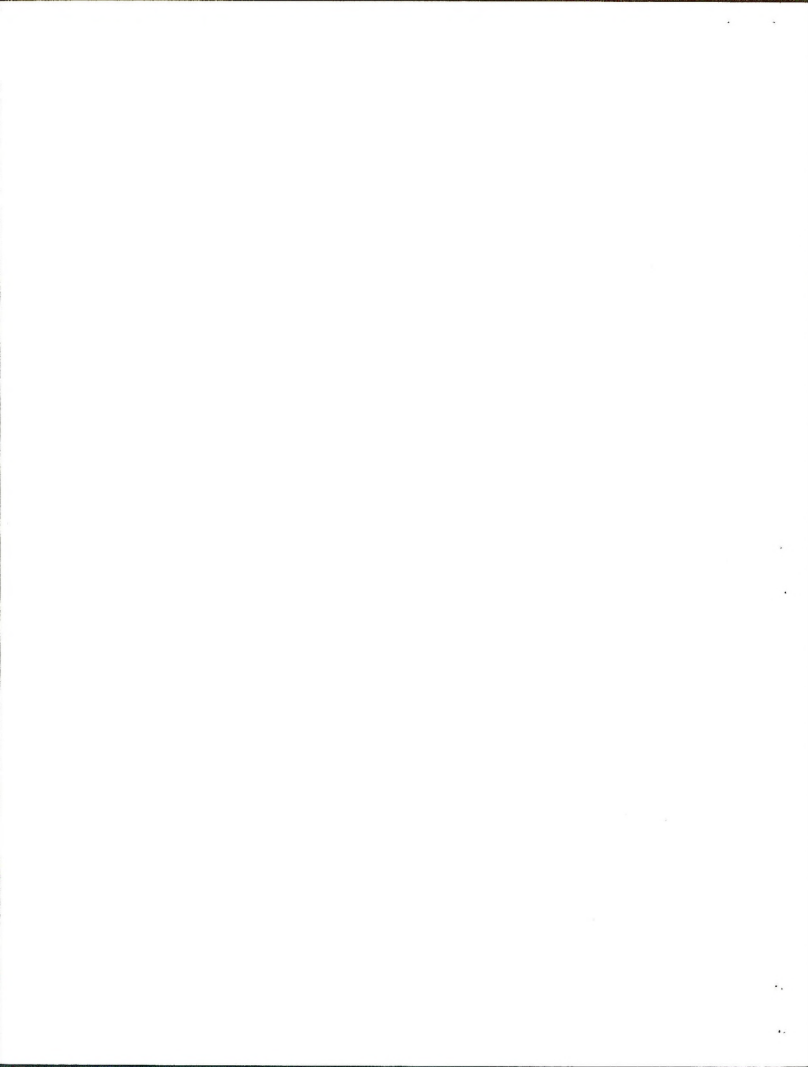
At the lower reaches, the floodplains are vegetated by winter deciduous microphylls e.g., mesquite (Prosopis velutina) and catclaw (Acacia greggii), which form a distinct border association that separates the riparian and desert-scrub climax communities. This transitional vegetation zone is often classified as a distinct community, the Subtropical Deciduous Woodland Biome. Within the Sonoran Desert, it is largely restricted to elevations below 1,067 m. where it attains maximum development on the alluvium of old floodplains.⁶ In the past, annual and perennial grasses and herbs formed the ground cover below mesquite dominated bosques and the understory was relatively open. But today, as on the Aravaipa floodplain, introduced annual forbs e.g., heron-bill (Erodium cicutarium), mustards e.g., London skyrocket (Sisymbrium irio), and grasses e.g., Bermuda grass (Cynodon dactylon), red brome (Bromus rubens), and Mediterranean grass (Schismus barbatus), are frequently encountered as understory species. Introduction of saltcedar (Tamarix pentandra) from the San Pedro River drainage is threatening to invade the Aravaipa area with its aggressive ability to outcompete the native riparian species such as seep willow and burro bush (Hymenoclea monogyra).



METHODS

Several collecting trips were made through the Aravaipa Canyon Primitive Area during the course of a year. Emphasis was placed on identifying the flora of Aravaipa Creek from the confluence of Turkey Creek to Woods Ranch and adjacent hillsides, with the listing expanded to include specimens from above and below these boundaries. Plant species were recorded according to personal observation and those specimens collected and processed were deposited at the Desert Botanical Garden herbarium (DES) Phoenix, Arizona. Identifications were made according to Kearney, Peebles, and collaborators (1960), except for the Cactaceae which followed Benson (1969). Certain other groups are treated according to recent revisions and monographic treatments.¹⁴

The vascular flora listed for the Aravaipa Creek Primitive Area consists of 150 species in 128 genera representing 58 families. Each species listed in the flora catalogue is grouped by family and followed by its author and common name, if available. The sequence of families follows that of Kearney and Peebles in Arizona Flora and the genera within each family are arranged by alphabetical order. All species listed have been reviewed for recent taxonomic revisions according to Lehr (1978) and their most current synonymy has been included. Plant specimens that were not in flower at the time of observation could not be keyed to species and are therefore listed in the catalogue at the generic level only. I have included them here in an effort to make the catalogue as complete as possible, fully realizing that this best represents a partial list of the actual flora present for the Aravaipa area.



CATALOGUE OF VASCULAR PLANTS OCCURRING
IN THE ARAVAIPA CREEK PRIMITIVE AREA

DIVISION: PTERIDOPHYTA. Ferns and Fern Allies

POLYPODIACEAE. Fern Family

Adiantum capillus-veneris L. Southern maidenhair fern

Asplenium resiliens Kunze. Small spleenwort

Cyrtomium auriculatum (Underw.) Morton.

Thelypteris puberula (Baker) Morton var. sonorensis A. Reid Smith.

DIVISION: SPERMATOPHYTA. Flowering Plants

CLASS: GYMNOSPERMAE

CUPRESSACEAE. Cypress Family

Juniperus monosperma (Engelm.) Sarg. One-seed juniper

CLASS: ANGIOSPERMAE

SUBCLASS: MONOCOTYLEDONEAE

TYPHACEAE. Cat-tail Family

Typha sp. Cat-tail

GRAMINEAE. Grass Family

Bromus rubens L. Red brome

Cynodon dactylon (L.) Pers. Bermuda grass

Schismus barbatus (L.) Thell. Mediterranean grass

LEMNACEAE. Duckweed Family

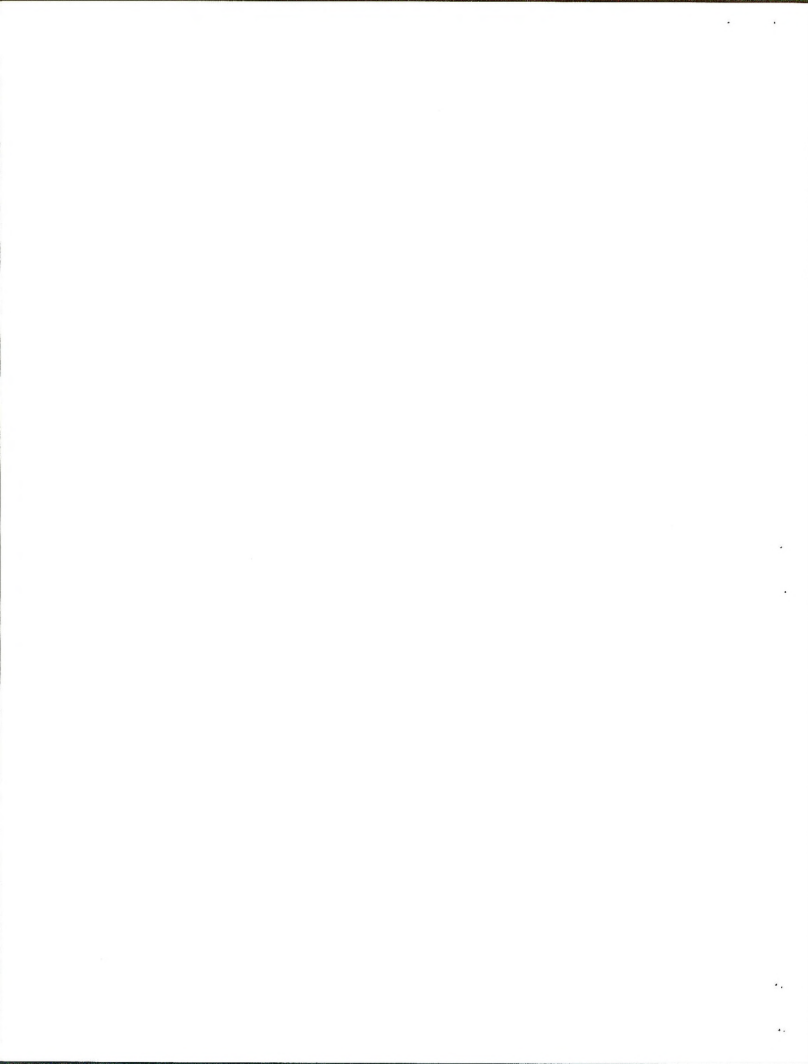
Lemna sp. Duckweed

AGAVACEAE. Agave Family

Agave chrysantha Peebles. Century plant

Dasylirion wheeleri Wats. Desert spoon, sotol

Holina microcarpa Wats. Beargrass



SUBCLASS: DICOTYLEDONEAE

SALICACEAE. Willow Family

Populus fremonti Wats. Fremont cottonwood

Salix bonolandiana H.B.K. Bonpland willow

Salix gooddingii Ball. Goodding willow

JUGLANDACEAE. Walnut Family

Juglans major (Torr.) Heller. Arizona walnut

FAGACEAE. Beech Family

Quercus turbinella Greene. Scrub oak

Quercus sp.

ULMACEAE. Elm Family

Celtis pallida Torr. Desert hackberry

Celtis reticulata Torr. Net-leaf hackberry

MORACEAE. Mulberry Family

Morus microphylla Buckl. Texas mulberry

VISCACEAE. Mistletoe Family

Phoradendron californicum Nutt. Desert mistletoe

Phoradendron tomentosum (DC.) Gray (P. flavescens (Pursh) Nutt.). Inierito

POLYGONACEAE. Buckwheat Family

Eriogonum abertianum Torr.

Polygonum lapathifolium L. Willow smartweed

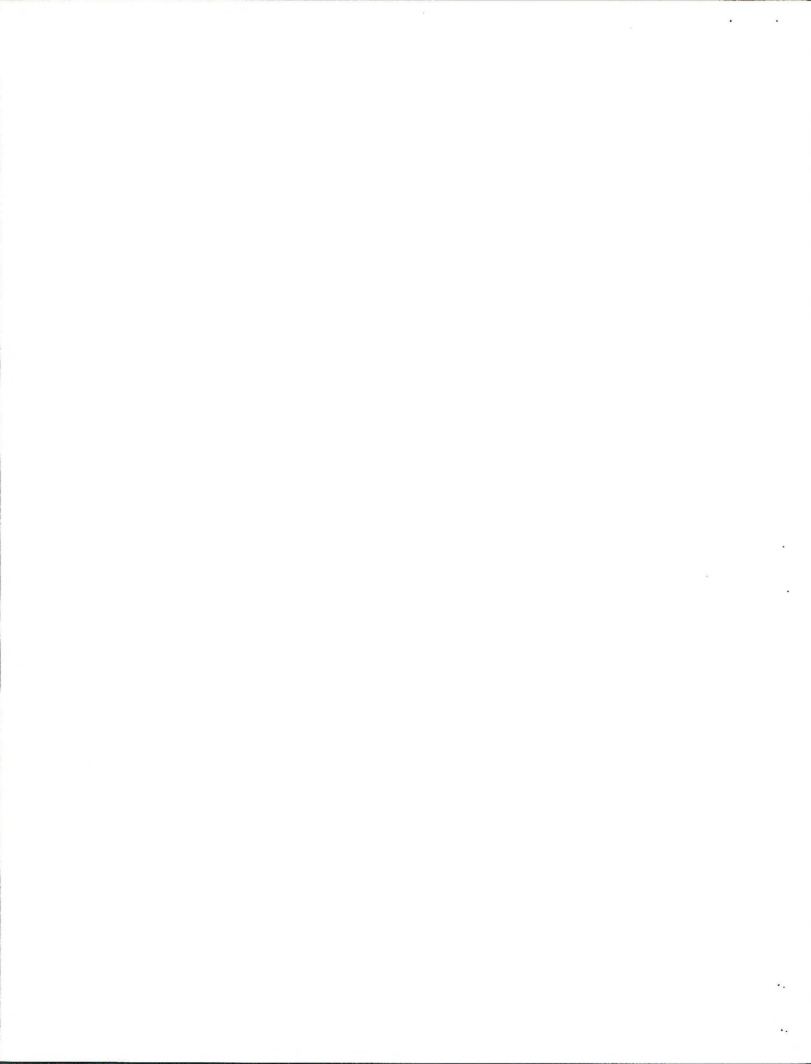
Polygonum sawatchense Small.

Rumex sp. Dock

CHENOPODIACEAE. Goose Foot Family

Atriplex canescens (Pursh) Nutt. Four-wing saltbush

Salsola iberica Sennen and Pau (S. kali L. var. tenuifolia (Tausch) Aellen).
Russian thistle, tumbleweed



AMARANTHACEAE. Amaranth Family

Amaranthus fimbriatus (Torr.) Benth. Fringed amaranth

NYCTAGINACEAE. Four O'Clock Family

Allionia incarnata L. Trailing four o'clock

PHYTOLACCACEAE. Pokeberry Family

Rivina humilis L. Rouge plant, coralito

BERBERIDACEAE. Barberry Family

Berberis trifoliata Moric. Algerita

CRUCIFERAE. Mustard Family

Lesquerella gordonii (Gray) Wats. Gordon bladderpodLesquerella purpurea (Gray) Wats.Rorippa nasturtium-aquaticum (L.) Schinz and Thell. Water-cressSisymbrium irio L. London skyrocket

PLATANACEAE. Plane Tree Family

Platanus wrightii Wats. Arizona sycamore

CROSSOSOMATACEAE. Crossosoma Family

Crossoma bigelovii Wats. Bigelow ragged rock flower

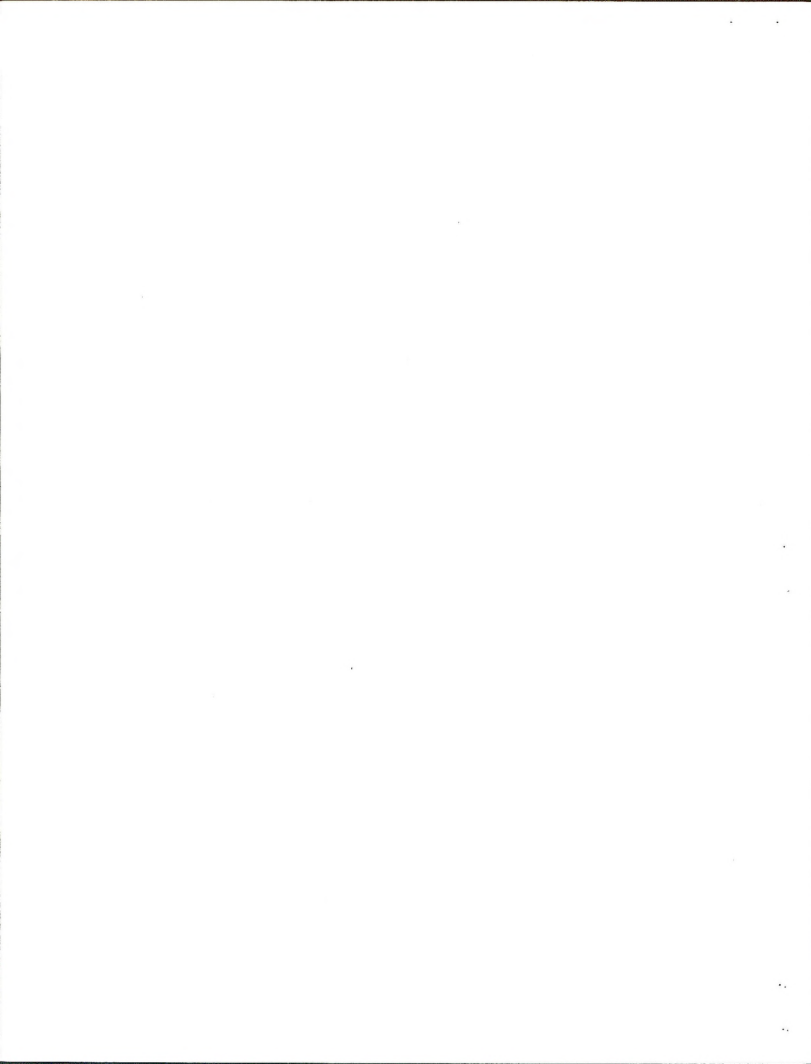
ROSACEAE. Rose Family

Prunus sp.

LEGUMINOSAE. Pea Family

MIMOSOIDEAE. Mimosa Subfamily

Acacia constricta Benth. White-thorn acaciaAcacia greggii Gray var. arizonica Isley (A. greggii Gray). CatclawCalliandra eriophylla Benth. Fairy dusterDesmanthus sp. Bundleflower



Mimosa biuncifera (Benth.) Britt. and Rose. Wait-a-minute bush

Prosopis velutina Woot. (P. juliflora (Swartz) DC. var. velutina (Woot.) Sarg.).
Velvet mesquite

CAESALPINIOIDEAE. Senna Subfamily

Cassia covesii Gray. Desert senna

Cercidium floridum Benth. Blue paloverde

Cercidium microphyllum (Torr.) Rose and Johnst. Yellow or little-leaf paloverde

PAPILIONOIDEAE. Bean Subfamily

Amorpha fruticosa L. var. occidentalis (Abrams) Kearns. and Peeb. Bastard indigo

Astragalus sp. Loco weed

Lotus rigidus (Benth.) Greene. Desert rock pea, deer vetch

Lupinus sp. Lupine

Medicago sativa L. Alfalfa

Trifolium sp. Clover

GERANIACEAE. Geranium Family

Erodium cicutarium (L.) L'Hér. Heron-bill

OXALIDACEAE. Wood Sorrel Family

Oxalis sp.

ZYGOPHYLLACEAE. Caltrop Family

Larrea divaricata Cav. Creosote bush

RUTACEAE. Rue Family

Choisya arizonica Standl. Star-leaf

Ptelea trifoliata L. subsp. angustifolia (Benth.) V. L. Bailey (P. angustifolia Benth.). Narrowleaf hoptree

MALPIGHIAEAE. Malpighia Family

Janusia gracilis Gray.



EUPHORBIACEAE. Spurge Family

Acalypha ostryaefolia Riddell. Hornbeam three-sided mercury

Croton texensis (Klotzsch) Muell. Arg. Dove-weed

Euphorbia sp. Spurge

SIMMONDSIACEAE. Jojoba Family

Simmondsia chinensis (Link) Schneid. Jojoba

* usually included in the Buxaceae Family

ANACARDIACEAE. Cashew Family

Rhus radicans L. var. rydbergii (Small) Rehder. Poison ivy

Rhus trilobata Nutt. Skunk-bush, squaw-bush

ACERACEAE. Maple Family

Acer negundo L. var. interius (Britt.) Sarg. Box elder

SAPINDACEAE. Soapberry Family

Sapindus saponaria L. var. drummondii (Hook. and Arn.) Benson. Western soapberry

MELIACEAE. Melia Family

Melia azedarach L. China-berry tree

RHAMNACEAE. Buckthorn Family

Rhamnus californica Esch. subsp. ursina (Greene) Wolf. California buckthorn

Rhamnus crocea Nutt. var. ilicifolia (Kell.) Greene. Hollyleaf buckthorn

Sageretia wrightii Wats.

Zizyphus obtusifolia (Hook. ex Torr. and Gray) Gray var. canescens (Gray)

M. C. Johnst. (Condalia lycioides (Gray). Graythorn

VITACEAE. Grape Family

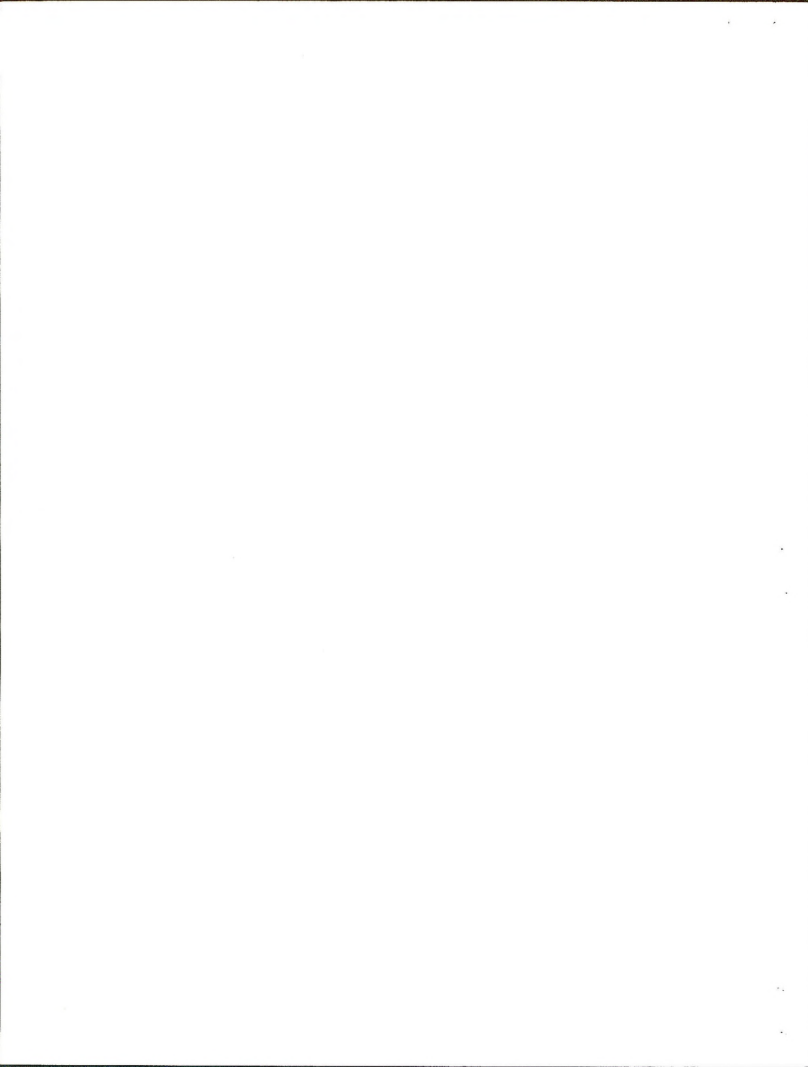
Vitis arizonica Engelm. Canyon grape

MALVACEAE. Mallow Family

Anoda cristata (L.) Schlecht. Spurred anoda

Malva parviflora L. Cheeseweed

Sphaeralcea ambigua Gray. Desert mallow



TAMARICACEAE. Tamarix Family

Tamarix pentandra Pall. Saltcedar

PASSIFLORACEAE. Passion Flower Family

Passiflora mexicana Juss. Passion flower

CACTACEAE. Cactus Family

Cereus giganteus Engelm. (Carnegiea gigantea (Engelm.) Britt. and Rose). SaguaroEchinocereus spp. HedgehogFerocactus wislizenii (Engelm.) Britt. and Rose. Fish-hook barrelMammillaria spp. PincushionOpuntia acanthocarpa Engelm. and Bigel. Buckhorn chollaOpuntia bigelovii Engelm. Teddybear chollaOpuntia fulvida Engelm. Chain-fruit chollaOpuntia kleiniae DC. var. tetracantha (Toumey) W. T. Marshall (O. tetracantha Toumey). Klein chollaOpuntia leptocaulis DC. Christmas cactusOpuntia phaeacantha Engelm.var. discata (Griffiths) Benson and Walkington (O. engelmanni Salm-Dyck).
Engelmann prickly pearvar. laevis (Coult.) L. Benson (O. laevis Coult.).Opuntia stanlyi Engelm. Devil cholla

ONAGRACEAE. Evening Primrose Family

Zauschneria californica Presl subsp. latifolia (Hook.) Keck. Hummingbird trumpet

UMBELLIFERAE. Parsley Family

Bowlesia incana Ruiz and Pavon. Hairy bowlesia

PRIMULACEAE. Primrose Family

Anagallis arvensis L. Scarlet pimpernel

PLUMBAGINACEAE. Plumbago Family

Plumbago scandens L. Leadwort



FOUQUIERIACEAE. Ocotillo Family

Fouquieria splendens Engelm. Ocotillo

OLEACEAE. Olive Family

Fraxinus pennsylvanica Marsh. subsp. velutina (Torr.) G. N. Miller. Velvet ash

ASCLEPIADACEAE. Milkweed Family

Asclepias linaria Cav. Milkweed

CONVOLVULACEAE. Morning Glory Family

Cuscuta sp. Dodder

POLEMONIACEAE. Phlox Family

Phlox tenuifolia E. Nels.

VERBENACEAE. Vervain Family

Verbena sp. Vervain

LABIATAE. Mint Family

Marrubium vulgare L. HorehoundSalvia amissa Epling. SageStachys coccinea Jacq. Texas betony

SOLANACEAE. Potato or Nightshade Family

Datura meteloides DC. Sacred datura, jimson weedLycium pallidum Miers. WolfberryNicotiana glauca Graham. Tree tobaccoPetunia parviflora Juss. Wild petuniaPhysalis acutifolia (Miers) Sandw. (P. wrightii Gray). Wright ground cherrySolanum douglasii Dunal. Nightshade

SCROPHULARIACEAE. Figwort Family

Maurandya antirrhiniflora Humb. and Bonpl. Blue snapdragon vineMimulus dentilobus Robins. and Fern. Monkey flowerVeronica anagallis-aquatica L. Water speedwell



ACANTHACEAE. Acanthus Family

Carlownrightia arizonica Gray.

RUBIACEAE. Madder Family

Cephalanthus occidentalis L. var. californicus Benth. Button bushGalium aparine L. Bedstraw

CUCURBITACEAE. Gourd Family

Marah gilensis Greene. Wild cucumber

CAMPANULACEAE. Bellflower Family

Lobelia cardinalis L. subsp. graminea (Lam.) McVaugh. Cardinal flower

COMPOSITAE. Sunflower Family

Acourtia wrightii (Gray) Reveal and King (Perezia wrightii Gray). BrownfootAmbrosia ambrosioides (Cav.) Payne (Franseria ambrosioides Cav.). Canyon ragweedAmbrosia confertiflora DC. (Franseria confertiflora (DC.) Rydb.). Slimleaf bursaAmbrosia deltoidea (Torr.) Payne (Franseria deltoidea Torr.). Triangle-leaf bursageArtemisia ludoviciana Nutt. SagebrushAster subulatus Michx. var. ligulatus Shinnery (A. exilis Ell.). AsterBaccharis salicifolia (Ruiz and Pavon) Pers. (B. glutinosa Pers.). Seep willowBaccharis sarothroides Gray. Desert broomBaileya multiradiata Harv. and Gray. Desert marigoldBebbia luncea (Benth.) Greene. Chuckawalla's delightBidens pilosa L. Bur marigoldBrickellia californica (Torr. and Gray) Gray. Pachaba, brickel bushEncelia farinosa Gray. Brittle bushEricameria cuneata (Gray) McClatchie var. spathulata (Gray) Hall
(Haploaappus cuneatus Gray var. spathulata (Gray) Blake). Desert rock goldenbushEriogonum divergens Torr. and Gray. Spreading fleabane



Erigeron oreophilus Greenm.

Gnaphalium sp. Cudweed

Haplopappus spinulosus (Pursh) DC.

Haplopappus tenuisectus (Greene) Blake. Burroweed

Helenium thurberi Gray. Sneeze weed

Hymenoclea monogyra Torr. and Gray. Burro bush

Hymenothrix wislizenii Gray.

Hymenothrix wrightii Gray.

Machaeranthera sp. sensu Cronquist and Keck

Perityle lemmoni (Gray) Macbride (Laphamia lemmoni Gray and L. dissecta Torr. sensu Kearn. and Peeb.).

Porophyllum gracile Benth. Odora

Psilostrophe cooperi (Gray) Greene. Paperflower

Solidago wrightii Gray. Goldenrod

Stephanomeria pauciflora (Torr.) A. Nels. Desert straw

Viguiera multiflora (Nutt.) Blake. Golden eye

Xanthium strumarium L. (X. saccharatum Wallr.). Cocklebur



SUMMARY BY MAJOR TAXA OF THE
KNOWN VASCULAR FLORA OF ARAVAIPA CREEK PRIMITIVE FLORA

Major Taxa	Families	Genera	Species
Pteridophyta	1	4	4
Spermatophyta			
Gymnospermae	1	1	1
Angiospermae			
Monocotyledonae	4	8	8
Dicotyledonae	52	115	137
Totals	58	128	150



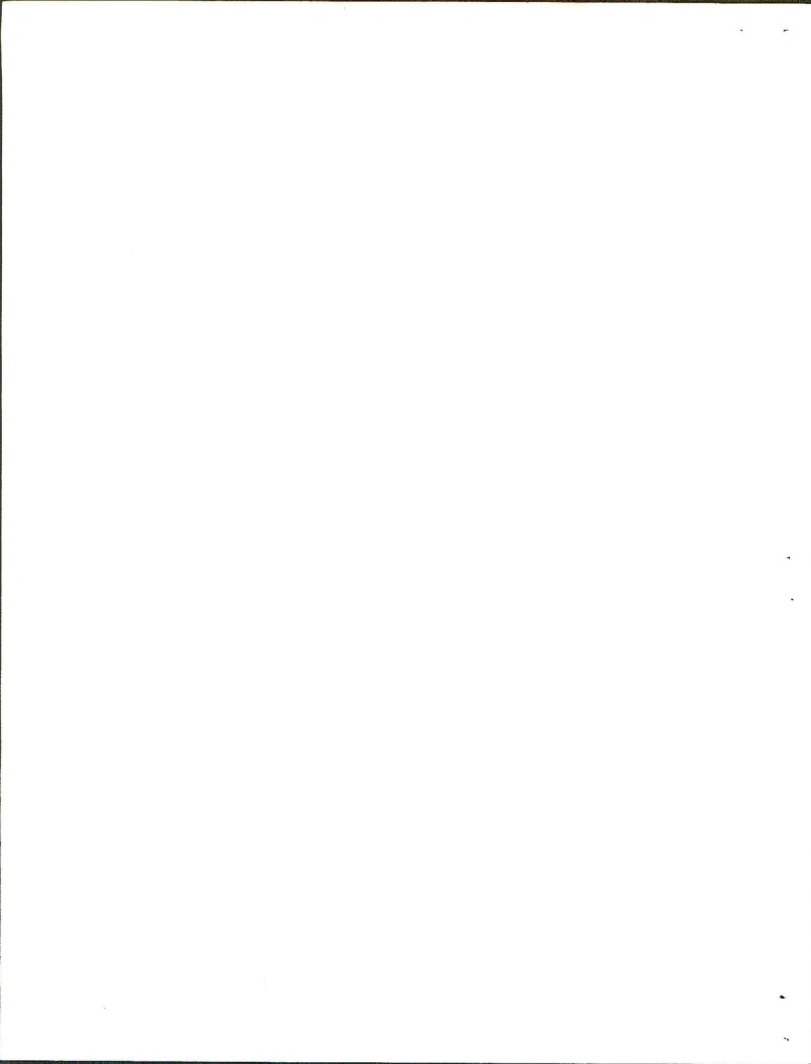
LIST OF AUTHOR NAME ABBREVIATIONS

Benth.	G. Bentham
Bigel.	J. Bigelow
Britt.	N. L. Britton
Britt. and Rose	N. L. Britton and J. N. Rose
Buckl.	S. B. Buckley
Cav.	A. J. Cavanilles
Coult.	J. M. Coulter
DC.	A. P. de Candolle
Ell.	S. Elliot
Engelm.	G. Engelmann
Esch.	J. R. Eschscholtz
Fern.	M. L. Fernald
Greenm.	J. M. Greenman
H.B.K.	F. W. H. von Humboldt
Harv.	W. H. Harvey
Hook.	W. J. Hooker
Hook. and Arn.	W. J. Hooker and G. A. W. Arnott
Humb. and Bonpl.	F. W. H. von Humboldt and A. J. A. Bonpland
Jacq.	N. J. von Jacquin
Johnst.	I. M. Johnston
M. C. Johnst.	M. C. Johnston
Juss.	A. L. de Jussieu
Kearn. and Peeb.	T. H. Kearney and R. H. Peebles
Kell.	A. Kellogg
L.	C. Linnaeus
Lam.	J. B. de Lamarck
L'Hér.	C. L. L'Héritier de Brutelle
Marsh.	H. Marshall
Michx.	A. Michaux
Moric.	M. E. Moricand
Muell. Arg.	J. Mueller
A. Neils.	A. Nelson
E. Nels.	E. E. Nelson
Nutt.	T. Nuttall
Pall.	P. S. Pallas
Pers.	C. H. Persoon
Robins.	B. L. Robinson
Ruiz and Pavon	H. R. Lopez and J. A. Pavon
Rydb.	P. A. Rydberg
Sandw.	N. Y. Sandwith
Sarg.	C. S. Sargent
Schlecht.	D. F. L. von Schlechtendal
Schneid.	C. K. Schneider
Standl.	P. C. Standley
Thell.	A. Thellung
Torr.	J. Torrey
Torr. and Gray	J. Torrey and A. Gray
Underw.	L. M. Underwood
Wallr.	C. F. W. Wallroth
Wats.	S. Watson
Woot.	E. O. Wootton



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